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# Australian Construction and Demolition Waste Challenges and Opportunities – Housekeeping notes

- This webinar will start five minutes post the start time to ensure everyone is online.
- Participant cameras and audio are switched off, this is to ensure the presenters do not have any disruptions.
- If you have issues with the audio or visual of the presentation please contact the moderator via the Q&A section in the bottom right hand corner of your screen
- Q&A for the presenters will be live throughout the session, please submit your questions via the Q&A section. Questions will be moderated and will be answered verbally at the end of the session.
- A post event survey will automatically pop up at the conclusion of the webinar, your feedback will be greatly appreciated.
- A Certificate of Attendance will be sent automatically if you complete the post event survey.





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# Australian Construction and Demolition Waste Challenges and Opportunities



# Acknowledgement of Country

Engineers Australia acknowledges the traditional custodians of the country throughout Australia and recognises their continuing connection to land, waters and community.

We pay our respects to them and their cultures; and to elders both past and present and emerging.





# A/Professor Tayyab Maqsood

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Associate Dean, Project Management  
Faculty, School of Property, Construction  
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# Background



## 2009-12: Focus on C&D waste management

- Hyder Consulting, 2011 and Edge Environment 2011 developed reports related to C&D management for Department of Sustainability, Environment, Water, Population and communities (Now Department of Agriculture, Water and the Environment)
- Beyond Waste Fund (EPA) funded our project “A Supply Chain Management Self Assessment Framework For Waste Minimisation For The Residential Sector”

## 2012-current: Emergence of Circular Economy, “Towards the circular economy” by McKinsey & Company

- Australia started to adopt circular economy principles, reuse, recycle, upcycle

## 2019/2020: Mixed focus on C&D management

- WA (Waste Authority) announced funding specific to C&D waste management (Up to AU\$10 million) e.g. Roads to Reuse pilot
- Vic provided support to expansion of major recycling facilities for C&D through Resource Recovery Infrastructure Fund (RRIF)

*“Less focus does not mean the problem has gone away, it is still there and in fact growing”*

## What is the problem?

- Rapid growth in construction activities in Australia in recent years has led to increased generation of (C&D) waste
- 20.4<sup>1</sup> Mt of C&D waste was generated across Australia during 2017-2018 (almost 43% of all waste)
- Failure to effectively manage C&D waste will have unintended economic, social, political and environmental repercussions<sup>2</sup>
- A holistic national approach is required to handle the growing issue of Construction and Demolition (C&D) waste management in Australia

1. Australian National Waste Report 2018. Department of the Environment and Energy
2. PARK, J. & TUCKER, R. 2017. Overcoming barriers to the reuse of construction waste material in Australia: a review of the literature. International Journal of Construction Management, 17, 228-237.

## Regulatory framework in Australia



- In Australia C&D waste management happens through three tiers of government: federal, state/territory, and local
- The federal government is not directly involved in regulating C&D waste
- State and territory: the majority of legislation occurs at state and territory government level. C&D waste management in each state/territory builds on the specific regulatory framework that prevails in that state
- This regulatory approach is the emergence of inconsistencies between jurisdictional regulations; it gives rise to barriers that impede effective C&D waste management activities<sup>1</sup>

1. Environment and Communications References Committee 2018. Never waste a crisis: the waste and recycling

# Policy Makers and Authorities- state level

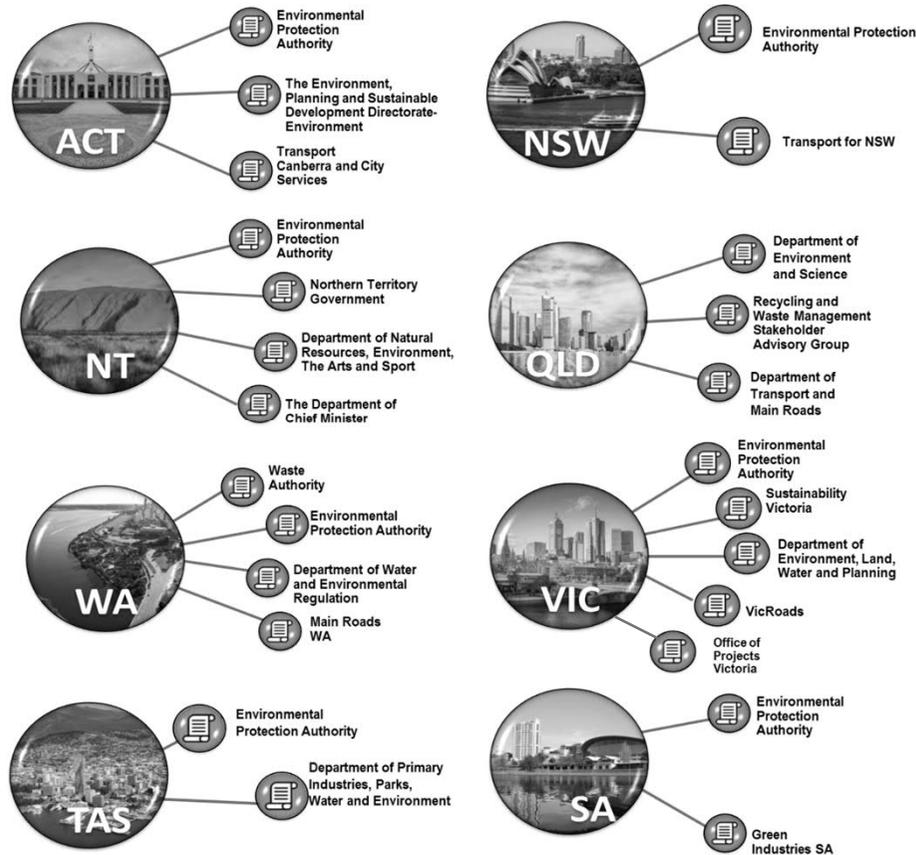


Figure 1: Agencies that contribute to C&D waste management legislation.

## Waste definition and classification

- Although the National Waste Policy 2010<sup>1</sup> set an objective to develop a national definition of waste, to date there is no consistent definition for general waste or C&D waste specifically
- The practice of waste definition is excessively associated with classification of hazardous materials and determination on landfill levy liability
- The legal definitions of waste, as written into regulations, have generally developed independently within each jurisdiction
- Despite having general similarities between definitions of waste, each jurisdiction uses specific wording and practical applications

1. National Waste Policy. 2010. Department of the Environment and Energy

# Waste classification

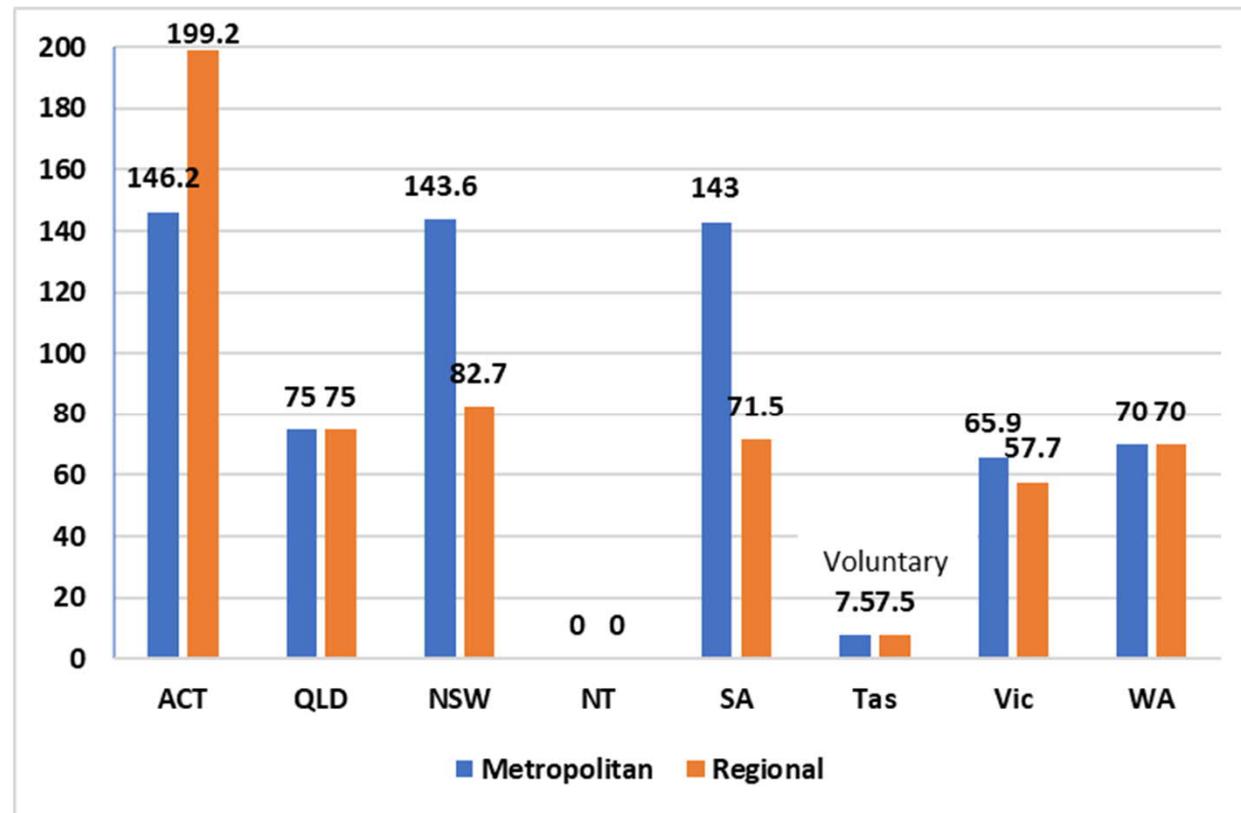


- The way that waste is classified has a significant impact on many aspects of waste management
- The main functions of classification in jurisdiction are to manage hazardous waste and granting permit and licencing
- The National Waste Policy advocates a classification that is based on three main streams: C&D, C&I and MSW.
- Yet this classification has not been used in waste related regulations in some of jurisdictions and other criteria (e.g. properties and the level of risk they may impose) are used to classify waste

*C&I: commercial and industrial, MSW: municipal solid waste*

# Landfill levy

Except for NT, each of Australia's other jurisdictions have introduced a landfill levy; however, levies are imposed in different ways



*Figure 2: Levy fees for C & D waste disposal in different Australia's jurisdictions. Source: EPA in each jurisdiction.*

# Illegal waste dumping penalty fees



Legislators have set different penalty fees for illegal waste dumping.

The most severe penalty is being applied (corporates) in NSW, where offenders face up to \$5 million

This is followed by the penalties in NT, Tas and ACT, which are \$2.86 million, \$1.59 million (+/5 year imprisonment) and \$1 million (+/7 year imprisonment), respectively.

The next lowest penalty fees are charged in SA (up to \$30 K), WA (up to \$125 K), Qld (up to \$217 K) and Vic (775 \$K).



## Waste management targets



Sustainable  
Built Environment  
National Research Centre



**Resource recovery and recycling targets:** ACT: 90% (2025), NSW: 80% (2021), Qld: 65% (2030), SA: 90% (2020), Tas: 40% (2025), Vic: 80% (2030) and WA: 75% (2020).

NT does not have a current target for recycling and reduced landfilling.

# Waste data management system



- Waste data is critical to well-targeted and planned evidence-based waste projects and programs
- In some jurisdictions, reporting waste data is obligatory and more than one authority could be responsible for waste data collection
- Among the jurisdictions, only four states (NSW, Qld, SA and Vic) have developed and operated a central data management system

**NSW: Waste and Resource Reporting Portal (WARRP)**

**QLD, the Queensland Waste Data System (QWDS)**

**SA: the Zero Waste Environment User System (ZEUS)**

**VIC: Sustainability Victoria operates the Waste Data Portal (WDP)**

# Waste strategy document

- Most jurisdictions have a strategy document
- Despite not having statutory power, they guide efforts to improve waste management in different jurisdictions
- It guides government organisations and industries in improving waste management over the strategy period
- Currently, Tas does not have a current waste strategy document



*Waste strategy documents.*

## Consistent approach to define and measure C&D waste across different jurisdictions

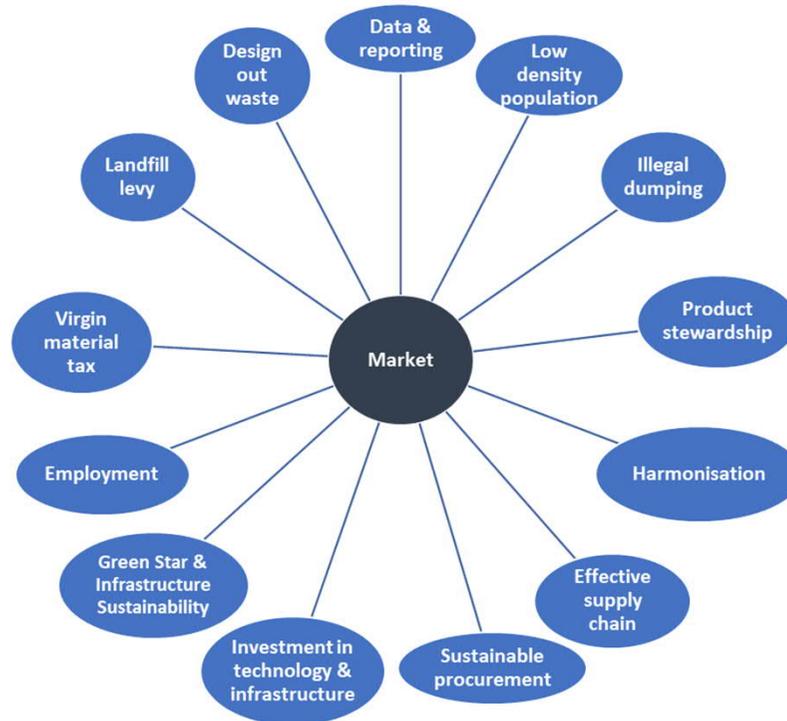
In NWP 2018 the concept of “a waste is not always waste” is promoted in the “Waste as a Resource- the Circular Economy” section

Qld, NSW and SA have adopted the NWP 2018 notion (waste as a resource).

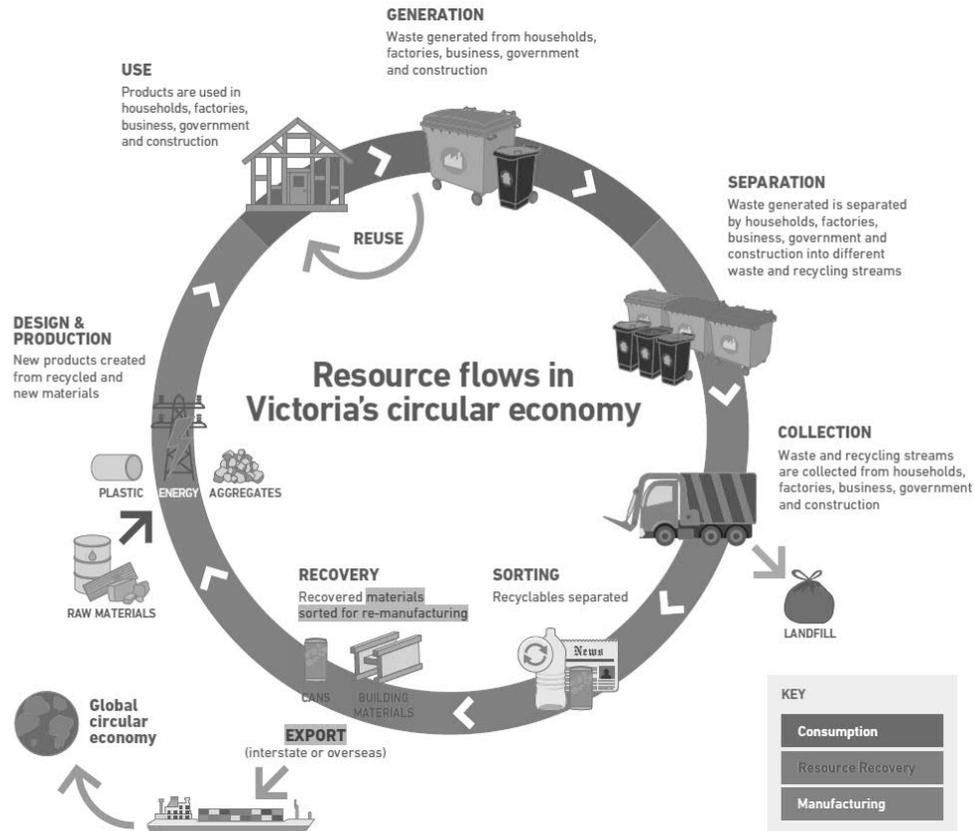
In Qld, the End of Waste (EOW) framework is proposed to promote resource recovery opportunities and aims to shift the common perception from “waste is always waste” to it being valued as a resource

## Development of marketplace

The development of a market for salvaged and recycled waste materials has been frequently emphasised in different policies, strategies, waste management principles and guidelines in Australia



# Circular Economy/Cradle to Cradle

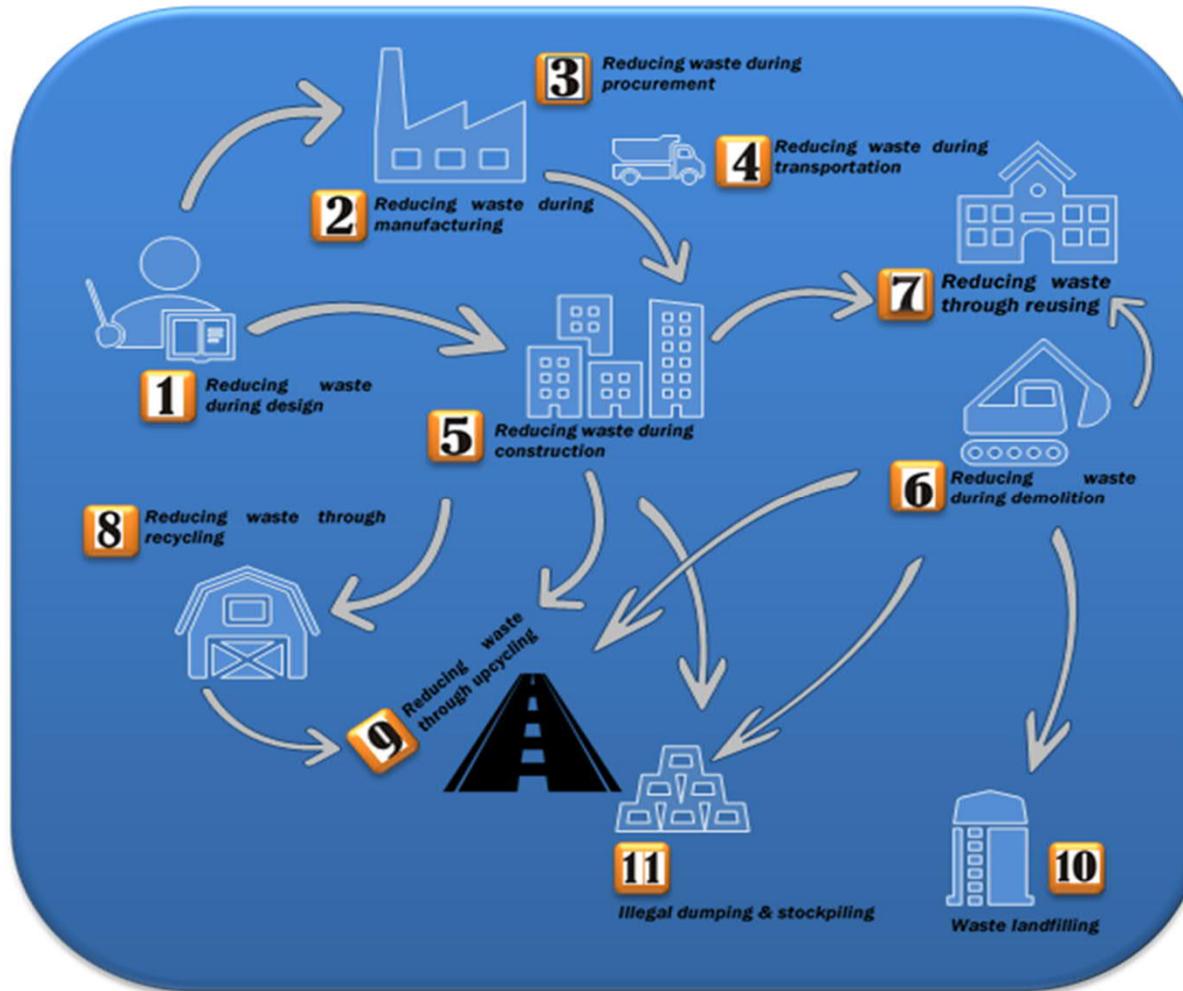


Sustainability Victoria, Statewide Waste and Resource Recovery Infrastructure Plan – Victoria 2015-44, p.47, 2015.

# Case studies using circular economy principles

- Bricks
- Timber
- Concrete
- Steel
- Glass

# Bricks LoWMoR model



## Opportunities to reduce brick waste disposal (LoWMoR) model

- Design appropriate landfill levy schemes to discourage brick waste landfilling
- Consider building standardisation to improve buildability and reduce the number of offcuts
- Supplier to provide more flexible “last pack” sizes i.e. a “fractional” pallet instead of a full pallet
- Use “Supply and Lay” model to eliminate brick leftover
- Develop an agreement where a contractor “sells back” the re-cycled waste from the original material supplier
- Ensure the bottom layers of bricks remain useable by preventing soil contamination

## Opportunities to reduce brick waste disposal (LoWMoR) model

- Store bricks in a stable flat area to avoid breakages from fall overs
- Determine a means for cutting bricks into half more accurately so that both halves can be used, and breakages avoided
- Take unwanted bricks back to brickyard for crushing and re-use in brick production; this can be also complemented by offering the customer leftover (full) bricks
- Include a clean-up payment in the scope of the bricklayer's subcontract to assist recycling and to discourage wasteful site practices
- Take brick left-overs away to use as aggregate or landscaping cover

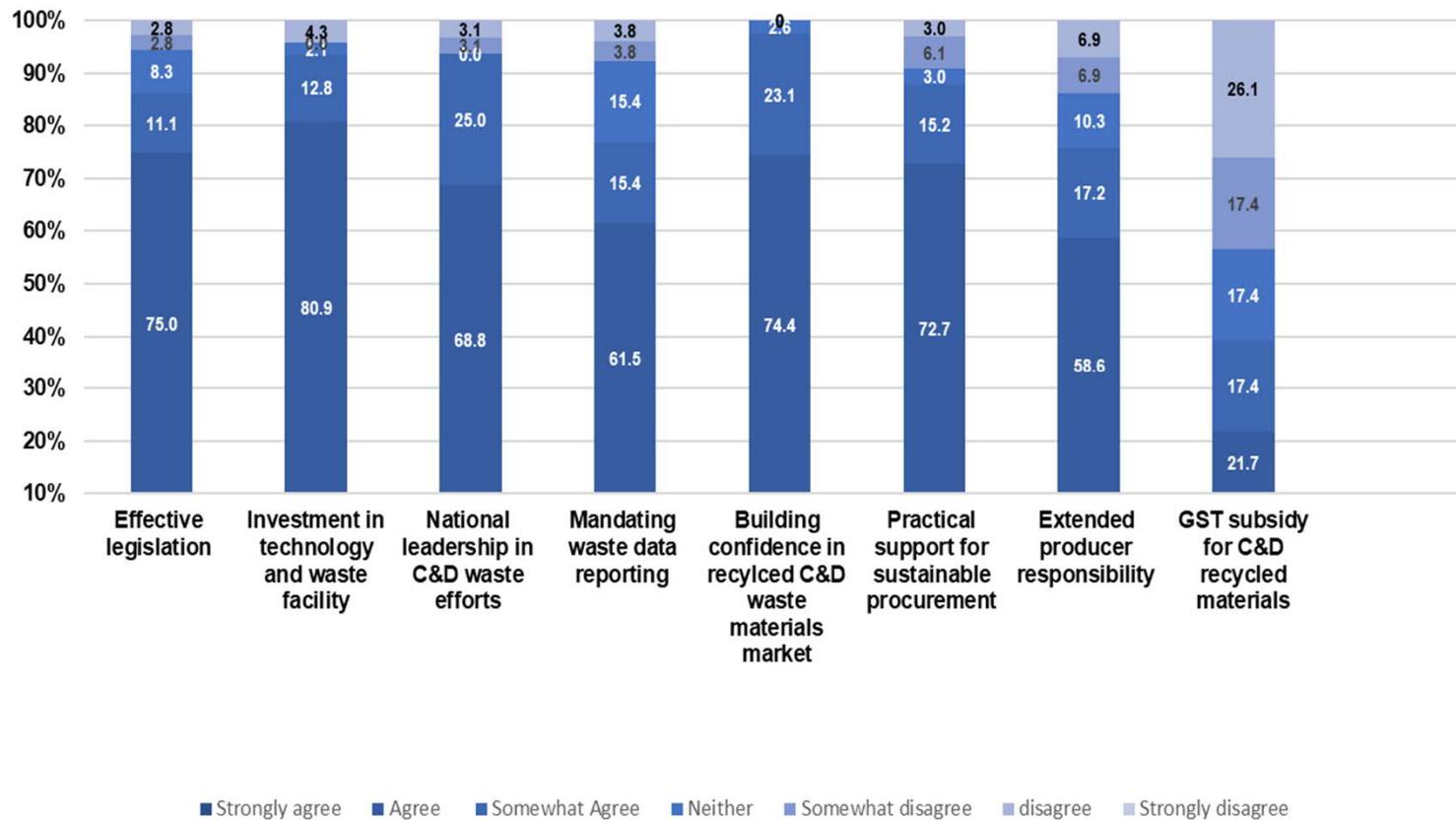
# Perception of Stakeholders

Question	Distribution	(%)
Field of activity	Construction	16
	Demolition	8
	Landfill	15
	Legislation	6
	Industry association	6
	Waste recovery	20
	Waste delivery and transport	10
	Consultancy	7
	Manufacturing	4
	R&D	3
	Regulations & enforcement	5
Experience	<6 years	43.1
	6–10 years	13.7
	11–15 years	16.7
	>15 years	26.5
State/territory	ACT	1.8
	NSW	24.3
	NT	6.3
	Qld	16.2
	Tas	3.6
	Vic	30.6
	WA	17.1

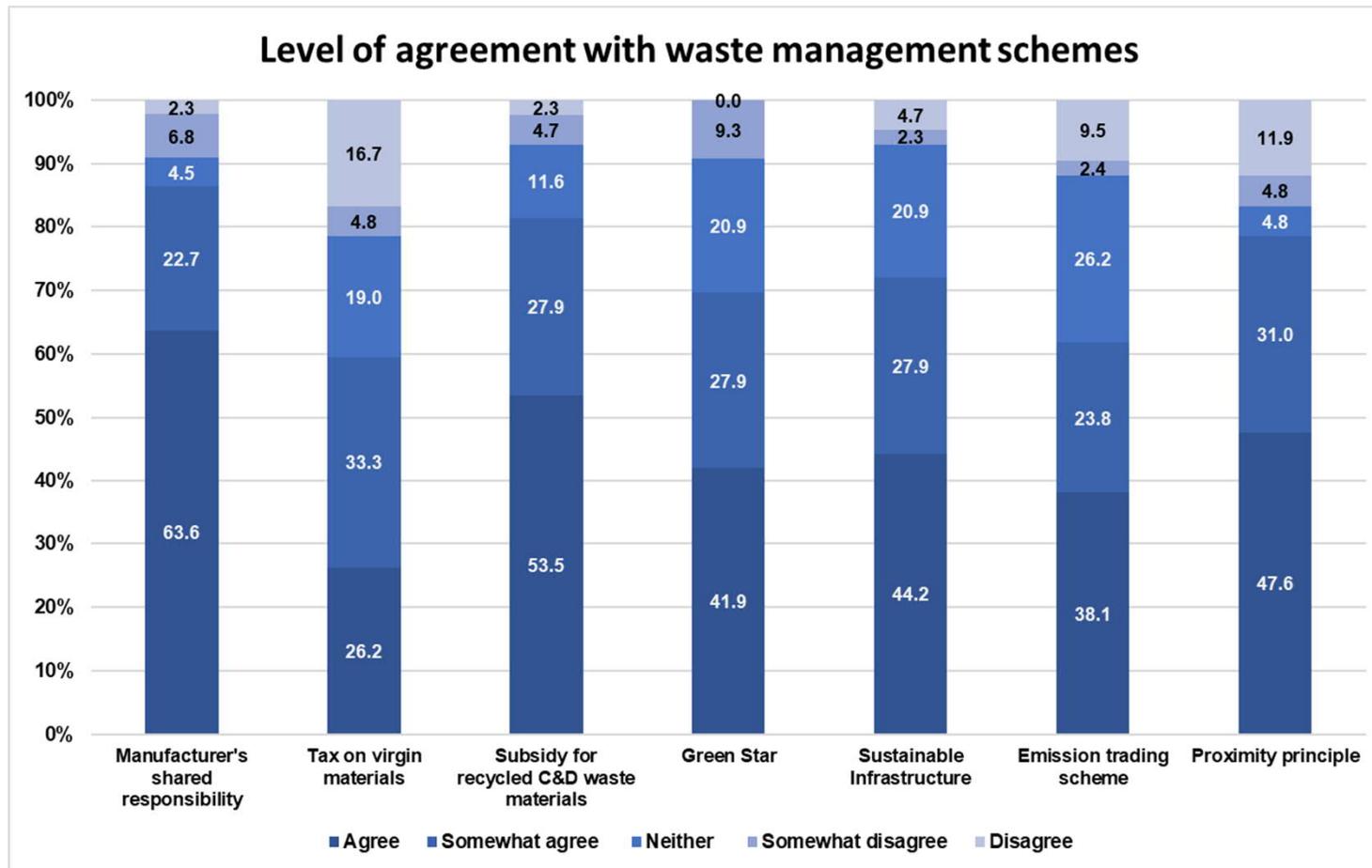
Sample size: 132  
July 2019- September  
2019

# Federal government role

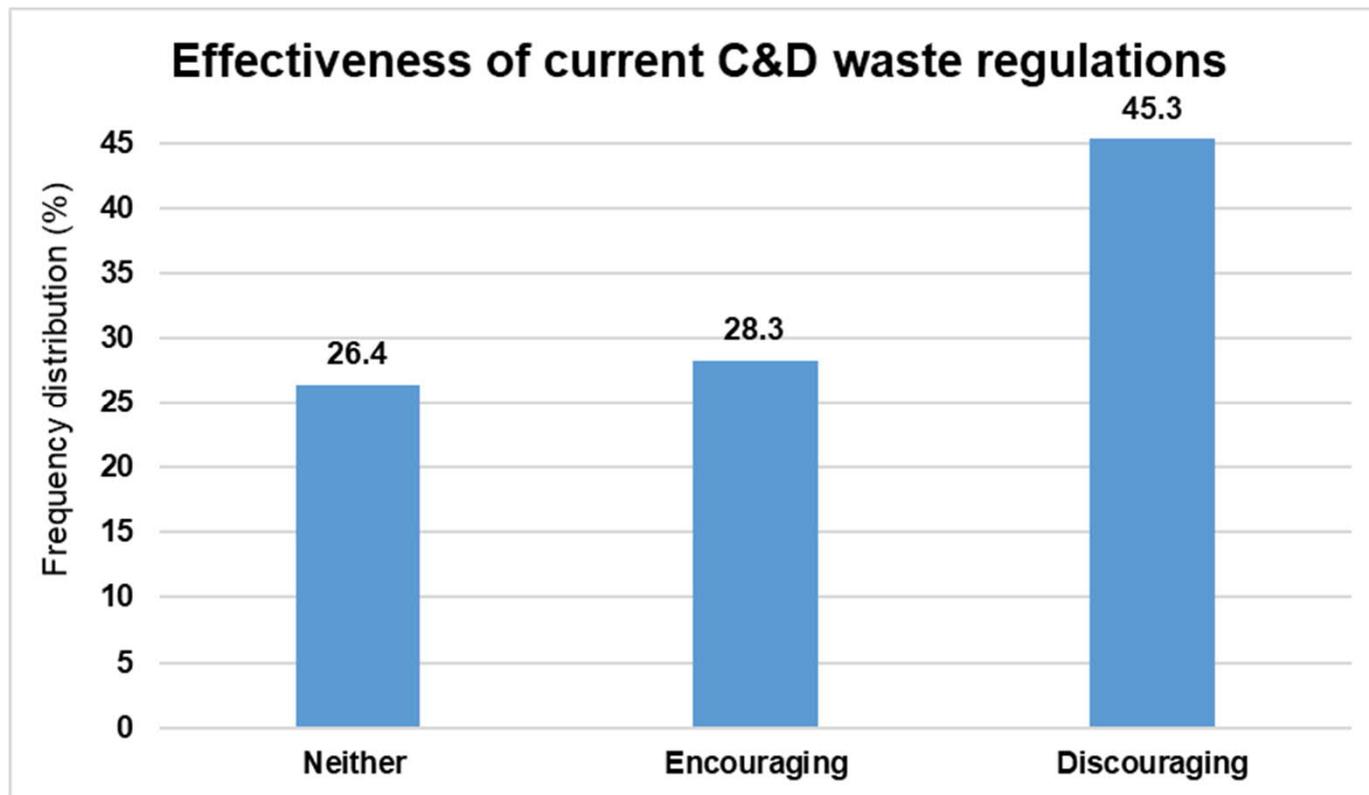
The Australian federal government role in C&D waste management



# Waste management schemes/strategies



# Effectiveness of current C&D waste regulations in motivating further recycling



# Recommendations



1. Develop appropriate EPR and similar schemes for greater impact and compliance.
2. Support and promote design out waste practices through funding and education.
3. Invest in technologies and infrastructure to accommodate the growing quantity of C&D waste.
4. Provide a GST subsidy for building materials with recycled content.
5. Invest in attitudinal change through R&D programs, leading to raising C&D waste stakeholders' awareness.
6. Mandate GS and IS principles with respect to waste minimisation, or award construction projects that support and fulfil the existing GS and IS requirements.

# Recommendations



7. Support the development of an efficient and effective supply chain system.
8. Mandate sustainable procurements within the public sector.
9. Review existing waste regulations, policies and strategies to provide further support for the waste management and resource recovery industries.
10. Promote a cradle-to-cradle approach in the design and manufacture of construction materials.
11. Establish a marketplace that facilitates the trade of salvaged and recycled C&D waste material.
12. Mandate developing and keeping as-built and as-renovated plans, including a bill of quantities.

## NATIONAL CONSTRUCTION & DEMOLITION WASTE RESEARCH AND INDUSTRY PORTAL (NCDWRIP)



This research and industry portal that provides insights into the Australian Construction and Demolition (C&D) waste management. Established in 2020, NCDWRIP aims to connect the key stakeholders working in the area of the C&D waste stream, including government agencies, the design, and construction industry, waste management and resource recovery industry, professional associations, and academia.

Dr Tayyab Maqsood

Let's Chat!  
We'll reply as soon as we can



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# Tom Laslett

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Vice Chair, College of Leadership and  
Management (CLM) Committee  
& Member Sydney Division Committee



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# Construction Waste

***construction waste*** means—

(a) material that results from the construction of buildings or infrastructure (such as roads, tunnels, airports and infrastructure for sewage, water, electricity and telecommunications) and includes materials such as—

(i) bricks, concrete, paper, plastics, glass and metal, and

(ii) timber, including unsegregated timber, that may contain timber treated with chemicals, and

(iii) soil or other excavated material (but not virgin excavated natural material within the meaning of Schedule 1 to the Act), and

- CI 90A - Protection of the Environment Operations (Waste) Regulation 2014



# Construction Waste

*According to the latest ABS stats, Construction is still the largest industry generator of all waste, which imposes significant cost but also highlights the moral obligation the industry holds, to reduce this environmental impact wherever possible:*

*“In 2016-17, the Australian economy overall generated or imported 68.9 megatonnes of waste, of which the largest contributors were:*

- *Construction (20.4 megatonnes, 29.6%)*
- *Households (13.8 megatonnes, 20.0%)*
- *Electricity, gas, water and waste services (12.7 megatonnes, 18.4%)*
- *Manufacturing (10.8 megatonnes, 15.6%).*

*Of the industries highlighted in the account, those with the highest waste intensity (waste generated (tonnes) divided by gross value added (\$ million)) were:*

- *Electricity, gas, water and waste services 291.0 t/\$m*
- *Construction 151.8 t/\$m*
- *Manufacturing 105.6 t/\$m.”*

(Ref: <https://www.abs.gov.au/ausstats/abs@.nsf/mf/4602.0.55.005>)

# Construction Waste

Government Levies on disposal costs.

## Waste Levy Rates

Metropolitan Levy Area: \$146.00 per tonne

Regional Levy Area: \$84.10 per tonne

## Concessional Waste Levy Rates Virgin excavated natural material

Metropolitan Levy Area: \$131.40 per tonne

Regional Levy Area: \$75.7 per tonne

However, the liability is extinguished once the waste is sent offsite for lawful recycling, reuse or disposal.

Historical waste levy rates in the Regulated Area  
**244% in 10 Years.**

Period	SMA	ERA	RRA
2019-20	\$143.60	\$143.60	\$82.70
2018-19	\$141.20	\$141.20	\$81.30
2017-18	\$138.20	\$138.20	\$79.60
2016-17	\$135.70	\$135.70	\$78.20
2015-16	\$133.10	\$133.10	\$76.70
2014-15	\$120.90	\$120.90	\$65.40
2013-14	\$107.80	\$107.80	\$53.70
2012-13	\$95.20	\$93.00	\$42.40
2011-12	\$82.20	\$78.60	\$31.10
2010-11	\$70.30	\$65.30	\$20.40
2009-10	\$58.80	\$52.40	\$10.00



# Construction Waste

## Challenges in Recycling Material

- Projects are unlikely to accept material unless its classified as ENM or VENM

VNM (Virgin Excavated Natural Materials)

ENM

- naturally occurring rock and soil that has:
  - a) been excavated from the ground, and
  - b) contains at least 98% (by weight) natural material, and
  - c) does not meet the definition of Virgin Excavated Natural Material in the Act.

(Very difficult to get this classification on materials, if extracted from Metro areas)

- RAP (Recycled Asphalt Product) will be taken back from asphalt contractors but wont accept material if its got any other materials (eg. Road Base) in the load etc.

(Need to ensure milling machine stops higher than bottom of AC to ensure this)

# Construction Waste

Projects restrict use of Recycled DGB due to risk of receiving asbestos contaminated products.

## Asbestos Contamination

Asbestos found in the supply of recycled DGB on a single Main Roads project in WA lead to the entire industry stopping the use of the product, even nationwide.

## Main Roads ban prompted price collapse

Recycled road base is commonly used in road building on the east coast of the country, but less so in the west.

That is because in 2012, WA's biggest road builder and potential buyer, Main Roads, stopped using the recycled product after an asbestos contamination scare on a single government project.

"That could have been quite easily dealt with. There's been a stuff up, let's deal with it and work through it, and Main Roads were prepared to do that," Waste and Recycling Industry Association chairman, Michael Harper said.

"But unfortunately the contractor involved got quite belligerent and Main Roads decided this is a lost cause.

"Main Roads since then have refused to use recycled road base because of that one incident, so as a consequence the value of the product has gone down."



Michael Harper says Main Roads was initially prepared to work through asbestos contamination issues. (ABC News: Glyn Jones)

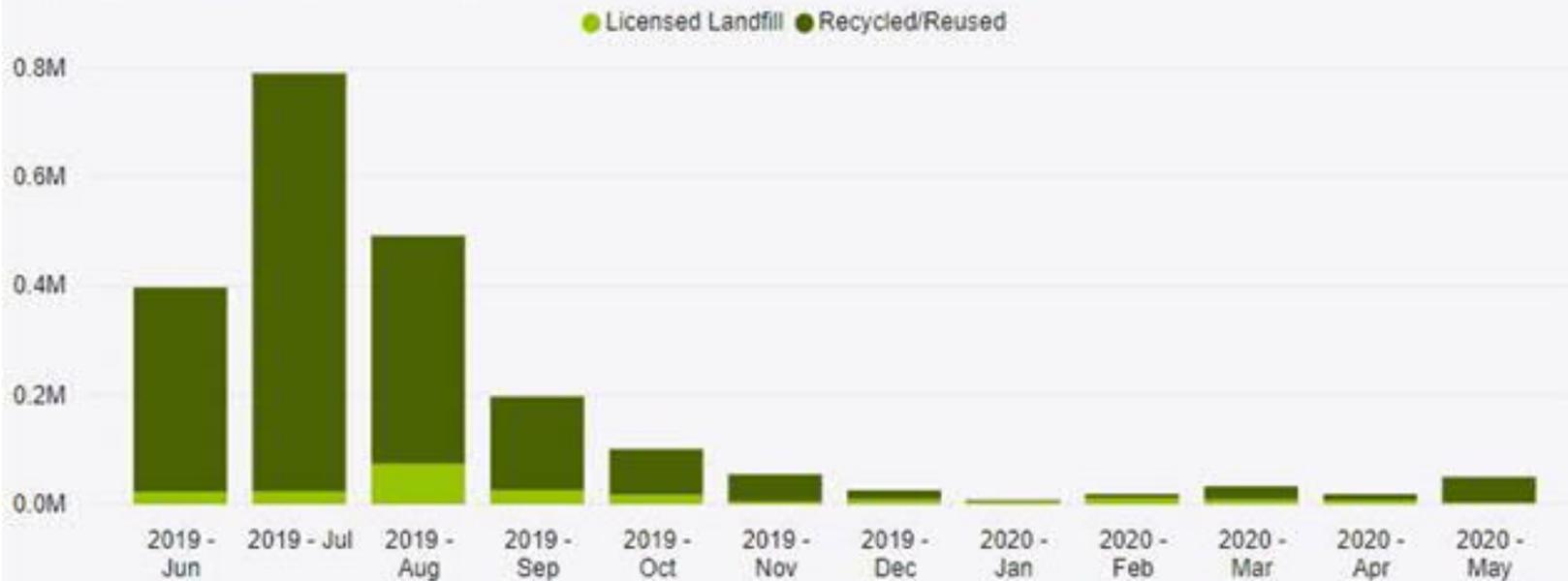
As a result of Main Roads' decision, other builders followed suit and prices plummeted by around 75 per cent.



# Waste Consideration at John Holland

## Waste

Total Waste Outcome T (Last 12 Months)



# Waste Consideration at John Holland

## Global Mandatory Requirements

GMR (Global Mandatory Requirements) on all our projects include

GMR 11 – Resources, Recycling & Waste Management

Intent: To manage resources efficiently, prevent pollution and minimise waste

- 11.1 A plan, describing methods to minimise waste and maximise efficient use of resources must be implemented and monitored
- 11.5 All workplaces must recycle construction and demolition waste, paper, cardboard, electronics, printer cartridges, fluorescent lights, glass, plastics and batteries, where recycling services are available
- 11.6 Recycled materials procured for use on site must be assessed to ensure they meet quality, contractual and legal requirements
- 11.7 Materials for re-use, recycling or disposal must be segregated and located in areas that are clearly defined and well signed
- 11.8 Spoil and inert waste to be reused off site must be risk assessed and meet legal requirements prior to transportation
- 11.9 Spoil and waste for disposal must be classified and transported by appropriately licenced contractors to licenced or approved facilities

# Waste Consideration at John Holland

## Waste Management Evaluation Criteria

On John Holland Projects, we review a broad range of criteria when selecting waste management and haulage contractors. Two major focus areas in these contractor evaluations are Ethical and Sustainable Scores

### 1.2.1 Waste Management Contractor Evaluation Criteria

- Other than pricing, projects shall also request/consider the following criteria (as a minimum) in their evaluation process:
- Evidence of licence to operate submitted by waste contractors and/or waste transporters for different sources/types of waste to be generated by project works;
- Evidence of compliance with Heavy Vehicle National Law; and
- Evidence of certification of AS/NZ 4801, ISO 14001 and ISO 9001

#### **Environment (Max score 4)**

- Does the organisation have an Environmental Management System?
- Is this accredited to ISO 14001?
- Has the organisation provided relevant details of their policy?
- Has the organisation been prosecuted for Environmental violations in the last 5 years?

#### **Ethical behaviour (Max score 2)**

- Has the organisation provided details of its ethical behaviour (or similar) policy?
- Has the organisation provided relevant details of their ethical behaviour (or similar) policy being implemented?

# Waste Consideration at John Holland

## Scrap Metal Recycling Services Panel

John Holland has put together a Scrap Metal Recycling Services Panel of contractors.

The panel members are specialised recycling contractors who will purchase our scrap metal directly from projects to ensure it gets a second life.

This approach enables us to save money by reducing waste disposal costs and be paid directly for the sale of scrap metal for recycling.

### 1.3.1 Contaminated Scrap

Projects shall, in segregating scrap metal into the allocated bins, proactively mitigate contaminants e.g. dirt, soil, concrete, rock, wood, plastics, rubber, paper, water, oil, hazardous or dangerous substances. For example, disposal of reinforced concrete into a scrap metal bin will result in additional costs being incurred by the project, or the material being rejected by the waste facility.







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## Opportunities - Spoil disposal & exchange

- A program to aggregate and share information on material flows across infrastructure and construction projects in NSW (or other states). To be used by contractors looking to optimise the exchange of spoils and fill from projects.
- A mock up was created in 2018 using data from John Holland, Mirvac, Downer, CPB and NSW Department of Planning and Environment (DoPE).
- A study by RCLG (Responsible Construction Leadership Group) found that of 8 Infrastructure Projects in NSW between 2018-2022 needed 7.9million m<sup>3</sup> of mostly VENM material requiring disposal. (\$2.48B in levies to dispose)



# Opportunities - Spoil Disposal & exchange

## Findings

- Competitiveness between haulage companies (and unwillingness to disclose disposal locations until a contract is in place) – Trade Secrets
- The preference of infrastructure projects in NSW to manage program risk by locking in large contracts for material disposal (VENM & ENM) long in advance
- Regulatory restrictions around road use by haulage companies that were not included in initial project approvals.



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## John Holland - Project Example

The NIFMF Project has successfully implemented the Plastic Police® recycling and engagement program and is the first construction site in Australia to do so.

The program was implemented to address the environmental concern of soft plastics ending up in landfill or in the environment and oceans as litter. Soft plastics have been shown to negatively impact marine and terrestrial species through consumption and entanglement and have been found to enter the human food chain as the material degrades into microplastics.

The NIFMF Project has been source separating soft plastics for recycling, including pallet wrap, shrink wrap, builder's sheeting, bubble wrap, product packaging and office-generated soft plastics.



## John Holland - Project Example

NIFMF then went on to engage Downer as a subcontractor to use the soft plastic they recycled to utilise it within an innovative product called Reconophalt.

The NIF project applied Reconophalt in early July, which contained 250kg of the projects soft plastic construction waste, which is equivalent to 60,000 plastic bags. Closing the loop!

Downer is the inventor and manufacturer of Reconophalt. This product differs from your business as usual asphalt as it contains a higher content of recycled material, closing the loop on the following waste streams:  
Soft plastic, Glass, Toner cartridges, Waste oil, Recycled Asphalt Pavement (RAP).

The Reconophalt product performs at a comparative, if not, higher quality in comparison to current “business as usual” asphalt products on the market. It is also a prime example of a circular economy initiative that is currently being adopted by many road authorities across the country.



Q&A





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# Thank you

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